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Examining the Impact of the Introduction of Tuition Fees in Sweden on International Student Mobility

by

yixuan sun 1044927212@qq.com

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Supervisor: Olof Ejermo
Examiner: Jonas Helgertz
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1 Introduction

The internationalization of higher education has witnessed rapid and substantial growth in the past decades. One of the major channels of it is international student mobility. According to OECD (2022) statistics, the mobility of international students has been expanding consistently for over 20 years before Covid, among which the number of international and foreign tertiary students grew on average by 5.5% per year between 1998 and 2019.

The same pattern of soaring incoming international students can also be observed in Sweden until 2011 in parallel with the global trend, shaped both by the worldwide increasing demand for higher education and Sweden's active attempts in embracing the internationalization trend to brand itself as a knowledge nation and a study destination (Åkerlund, 2020). What is more, the free tuition fee policy for all students regardless of their nationality influenced by the country's longstanding egalitarian and meritocratic tradition of viewing students as important potential pillars of human capital in the building of a welfare system has further enhanced the appeal of Sweden as a destination for international students (de Gayardon, 2019; Marcucci & Johnstone, 2007).

However, for the consideration of sharing the cost of internationalization, enabling control of cost and influx of international students, enhancing the quality, and contributing to national branding, the Swedish government decided that the free tuition fee policy should be no longer eligible to international students outside of EU and EEA (Lundin & Geschwind, 2023). This resulted in the introduction of tuition fees for undergraduate and graduate education for students from countries outside of EEA and Switzerland since 2011. The immediate impact was a sharp decline of 80% in the number of international students from these countries in the year, and while there has been a gradual recovery in the numbers since, the overall figures of international students from tuition fee countries have not yet reached the pre-policy reform levels.

Much previous research has discussed the motivation and impact of tuition fee reform in Sweden from an institutional level. Some research draws emphasis on how the policy itself reflects the conflicts of different views toward higher education in a welfare country system and under the influence of marketization ideas driven by neoliberalism ideology (Benner & Holmqvist, 2023; Börjesson & Dalberg, 2021; Holmén & Ringarp, 2023). Some scholars analyze the tuition fee reform more from the internationalization perspective, focusing on how the policy was spurred and have an impact on the internationalization of Sweden's higher education (Lundin & Geschwind, 2023; Åkerlund, 2020). Although there is also research reflecting on how the tuition fee policy has made a difference in international students' numbers (Nilsson &Westin, 2022), there is still a gap in the quantitative examination of the policy's impact on international student mobility in Sweden.

The purpose of this article is to utilize the difference-in-difference (DID) method to empirically examine the effects of the tuition fee policy on international student mobility in Sweden. The study will use tuition-free students from the EU/EEA and Switzerland as a control group and tuition-fee students from outside of these regions as a treatment group. The research aims to determine whether the tuition fee reform has had a significant impact on the number of incoming international students in Sweden, and its varying impacts on international student mobility from different continents.

The following structure will be followed in this thesis: Initially, in Chapter 2, the background of global international student mobility and its Swedish context will be presented, and the motivations, patterns, and determinants behind international student mobility will be discussed. Also, the relationship between tuition fees and student mobility will be covered. The main event in our study, the tuition fee reform in Sweden in 2011, will also be introduced in this chapter. Next, in Chapter 3, we will explain the data used in our research, the data source, and definitions will be included. In our method part, Chapter 4, our estimation methodology, the difference-in-difference approach, will be introduced. Then, the findings of our analysis will be reported, followed by a discussion of the mechanisms and implications related to our results in Chapter 5. Finally, the research will be concluded by summarizing the previous research outcomes and addressing the research questions that were formulated.

2 Background

2.1 Context of International Student Mobility

The UNESCO Institute of Statistics (UIS) provides a definition of international students as individuals who have left their country of origin to study in another country. It is worth noting that students tend to study abroad at more advanced levels of education. In OECD countries, while international students make up only 5% of bachelor's students, they account for 14% of master's students and 24% of doctoral students on average (OECD, 2022).

In recent decades, the number of international students in higher education has grown rapidly, increasing from 0.8 million globally in 1975 to 3.5 million in 2016, representing a more than fivefold increase (OECD, 2022). Over the past three decades, international student mobility has experienced significant growth in comparison to total international migration. This trend has become more pronounced in recent years. From 1998 to 2004, international student mobility increased by 52%, while world migration only grew by 13% (IOM, 2008).

English-speaking countries are among the largest host for international students. The four most popular destination countries for international students are the U.S., the UK, Australia, and Canada. These countries witnessed sizable growth from 2002 to 2009. Canada experienced the highest growth rate, with a 67% increase in international student enrollment from 2002 to 2009, rising from 52,650 to 87,798 students. The UK and Australia followed closely with growth rates of 62% (from 227,273 to 368,968) and 43% (from 179,619 to 257,637), respectively. Despite slower growth at 13%, the U.S. remained the top destination for international students, enrolling about one-fifth of all mobile students worldwide in 2009 and maintaining its position as the leader in terms of total enrollment numbers (Choudaha & Chang, 2012).

As for the sending countries of international students, the geography of international student mobility has undergone significant changes, with a notable increase in movement from developing countries, particularly China and India, as well as more developed Asian nations like Japan and South Korea (King et al., 2010). This trend is exemplified by the number of Chinese students studying abroad rising more than four times from 1999-2013, from 123,076 to 712,157. On the other hand, the United States and the United Kingdom have experienced a relative decline in students studying abroad. In contrast, other European countries such as France, Germany, and Greece have experienced stronger growth rates and overall better performances (King et al., 2010).

2.2 Motivations Behind International Student Mobility

From an individual level, there are multiple explanations for students' motivation to pursue their education across the border. Studying abroad provides access to high-quality education at prestigious institutions and the opportunity to acquire skills that may not be available domestically (King & Sondhi, 2018). Through studying abroad, students can also access career opportunities in globalized labor markets and increase employability, and for some, it can serve as a first step toward long-term migration (Crossman and Clarke, 2010; Wintre et al., 2015).

For sending countries, sending students abroad can bring both positive and negative consequences. The most commonly discussed negative consequences for sending countries is Brain drain. This phenomenon refers to the situation that highly skilled and educated individuals from developing countries tend to migrate to more developed countries in search of better economic and professional opportunities, resulting in a loss of human capital and intellectual resources in developing countries, which are crucial for their economic and social development (Docquier & Rapoport, 2012). On the other hand, if mobile students either return to their home country after study or maintain links with nationals at home, their origin country can benefit by gaining intellectuals equipped with advanced knowledge and technology, which can greatly enhance productivity and promote economic advancement. In addition, students who have had the

experience of studying abroad have a better understanding of foreign cultures and global affairs, which can assist their sending country in better integrating into worldwide networks and cross-border cooperation in academic, cultural, social, and political aspects.

For host countries, international students can have a significant impact on the economies and innovation systems of host countries, as they often provide a crucial source of revenue (Halterbeck and Conlon, 2021). International students' economic value to the host country not only assert through their tuition fees and registration fees, which is normally higher than that of the domestic students', but they also contribute to the local economy by spending on living and tourism (Canmac Economics, 2020). Furthermore, highly educated international students have the potential to seamlessly integrate into the local job market, leading to improved economic performance and innovation in the long run. Attracting international students, particularly those who choose to remain in the host country for an extended period, can therefore facilitate access to a global talent pool, support the development of production and innovation systems, and mitigate the potential impact of an aging population on the availability of skilled labor in many countries (Hawthorne, 2008).

On the other hand, providing higher education to foreign students has been a significant means for host countries to spread cultural, economic, and political values around the world. For instance, historical colonial countries tend to encourage the migration of students from former colonies as part of the global package of foreign aid. The experience of studying in a foreign country, especially in a democratic country, is an effective way to promote democracy in the origin countries of the students (Spilimbergo, 2009).

2.3 Three Waves of International Student Mobility

Despite the overall growing trend of international student mobility in the past decades, the mobility patterns have undergone several major changes marked by two main events, namely the 9/11 terrorist attacks of 2001 and the global financial recession of 2008, which in general have divided

the world's international student mobility patterns into three waves between 1999 and 2020 (Choudaha, 2017).

The first wave of international student mobility (Wave I), which occurred between 1999 and 2006, was driven by the increasing need for highly skilled professionals to promote economic and technological development (Choudaha, 2017). During this period, international students mostly enrolled in science, technology, and engineering fields (OECD, 2001). Institutions aimed to attract international students by gaining access to research funding, achieving research excellence, and responding to the high demand for labor in ICT fields. This wave of international students was characterized by factors such as academic readiness, self-direction, and dependence on financial aid and scholarships from institutions (OECD, 2005).

The USA was a top destination due to its research opportunities and funding, particularly for master's and doctoral degrees in science and technology (National Research Council, 2005). However, the 9/11 terrorist attacks led to stricter visa requirements for students, making it harder for students from particular countries in Asia to pursue their studies in the USA, the flow of students turned to other countries (OECD, 2005). At the same time, the Bologna process in Europe, which was launched in 1999 and is an initiative aimed at creating a unified higher education system across the continent, has greatly fostered student mobility within Europe (Wächter, 2004). The combined reasons mentioned above have resulted that some of these Asian students obtaining a post-secondary education in Europe (Choudaha, 2017). Hence, the competitive position of Sweden was strengthened, and Sweden has since then seen an increase in students from Asia (Nilsson & Westin, 2022).

In terms of the top countries of origin for international students in the first wave, even though the number of Chinese students studying abroad increased by 231%, a significant proportion of them opted to study in neighboring countries such as Japan or South Korea. Meanwhile, both India and South Korea experienced substantial growth in the number of students studying abroad, with a particular focus on science and engineering fields (Choudaha, 2017).

The second wave of international student mobility (Wave II) took place from 2006 to 2013 and was triggered by the global financial crisis of 2008. The crisis led to significant budget cuts in higher education sectors worldwide (Eggins & West, 2010). As a result, many higher education institutions turned to be more interested in recruiting international students, whose tuition fees were often higher than those of domestic students, to generate revenue.

In the second wave of international student mobility, there was a noticeable shift in the field of study. Due to the reduction in funding for research programs, a significant number of students in this wave were self-financed. As a result, they tended to concentrate more on business studies, particularly at the undergraduate level. This was in contrast to the first wave where science and engineering fields were more popular among international students at the master's and doctoral levels (Choudaha, 2017).

The rapid growth of China's economy led to an increase in the number of middle-class families who could afford to send their children overseas for studies. Additionally, many Saudi students were able to go abroad due to scholarships provided by the Saudi Arabian government. As a result, the attraction of new sources of revenue from self-funded Chinese students and government-funded Saudi students led to a significant increase of 75% in the number of Chinese students studying abroad. Consequently, Saudi Arabia emerged as the sixth-largest provider of globally mobile students by the end of the second wave (Choudaha, 2017). In contrast, this period also featured the decline of students who are more economically disadvantaged and more relied on funding from institutions (Choudaha 2014). An example here is that Indian students' international mobility pace slowed down tremendously to 25%, compared to 163% during the first wave.

Choudaha (2017) argues that the third wave of international student mobility (2013-2020) was influenced by three major events: the economic slowdown in China, Brexit, and the election of Donald Trump as the President of the USA. These events had a profound impact on both the supply and demand sides of international student mobility. The slow economic growth in China, one of the largest sources of international students, resulted in a deceleration in the growth of Chinese students going abroad and affected their study-abroad destinations, as they looked for more affordable options. In addition, the anti-immigration tone in the top two destination countries,

following the political upheavals, negatively impacted the perception of safety, post-graduation work, and immigration opportunities (Najar and Saul 2016).

While traditional top destination countries for international students are closing their doors and becoming less appealing due to their restrictive immigration policies, the previously less noticed destinations are emerging as attractive options. Countries such as Canada and Australia, with more open and welcoming immigration policies, are likely to benefit from the current uncertain and unwelcoming environment. Additionally, countries in the EU are gaining popularity due to their lower costs and efforts to enhance international competitiveness. Sweden, for instance, has set a goal to become a knowledge nation and study destination as part of its education strategy plan, with the aim of increasing its international visibility in higher education and research (SOU, 2018).

2.4 Determinants in International Students' Mobility Destination

The decision to migrate is often viewed as an investment in one's human capital, with the aim of securing better job prospects and higher future income (Beine et al., 2014). According to Rosenzweig's (2006) research, there are two models that explain the international mobility of students to developed nations. The first model is the school-constrained model, where individuals migrate due to a lack of educational opportunities in their home country, regardless of the potential return on education. The second model is the migration model, where individuals use student visas as a means to enter and remain in a foreign country, with the purpose of escaping the low returns on education in their home country. These two models explain two different motivations for students to pursue their education abroad, and thus, the factors that matter in their destination country choice can vary.

The school-constrained model suggests that students move to acquire human capital and then return home to enjoy the benefits of their educational investment in their home country. In this case, academic reputation, the variety of courses, the quality of education, campus safety,

costs/fees, campus location, and the opinion of others have been identified as significant contributors to students' decision-making process (Shanka et al., 2006).

In the migration model, the factors that affect migration costs, such as the distance including both physical and cultural distance between the origin and destination country, tuition fees and living costs during the education, and factors affecting expected returns to foreign education, including employment opportunities, salary level and the immigration policies in the destination country, influence students' mobility destination. In terms of migration costs, Beine et al. (2014) find that there is a strong network effect on international student mobility. The higher the level of education of migrants already present in the host country, the higher the flow of students of the same nationality.

2.5 Tuition Fees and Student Mobility

Tuition fees in higher education present a complex and intricate landscape, varying widely from country to country. According to Cai and Kivistö (2013), some countries regard higher education as a public good that will benefit the whole society from a human capital perspective, thus tuition fees in higher education in these countries are substantially subsidized by public finance; while in other countries, higher education is regarded as a tradeable economic sector, and in these countries, the provision of higher education follows a cost-sharing model, according to which the beneficiaries of education should share its costs, thus balancing the financial burden and potentially improving the longevity of higher education systems (Johnstone, 2004; Molesworth et al., 2011). These divergent philosophies influence tuition fee structures and student enrollment trends, particularly concerning international student mobility.

Supporters of charging tuition fees in higher education often contend that if these funds are used to enhance the quality of universities, they might actually boost enrollment. Furthermore, when tuition fees are introduced, they are frequently accompanied by substantial, subsidized loan programs designed to alleviate any negative impacts on students who may be constrained by their

financial situation. On the other hand, opponents of tuition fees argue that the introduction of tuition fees could pose a hurdle for students from financially disadvantaged families, preventing equal access to education opportunities. They also suggest that such fees could deter students from enrolling in higher education programs (Hübner, 2012).

Whether tuition fees should be introduced in higher education has been a perennial debated topic for the consideration of societal equality and many other reasons, however, in many countries, international students are regarded as a group for which higher tuition fees are less politically controversial (Sanchez-Serra & Marconi, 2018). In about half of the OECD countries, public educational institutions charge different tuition fees for national and foreign students enrolled in the same programs. The 1980s marked the beginning of a shift towards treating international higher education as an export industry. In the early1980s, the UK introduced full-cost tuition fees for international students as part of a broader reform effort aimed at encouraging Higher Education Institutions (HEIs) to find funding beyond government sources (Williams, 1997). Other primarily English-speaking nations, such as the U.S., Australia, Canada, and New Zealand, followed the UK's lead, legitimizing the trend to view higher education for international students as a lucrative export industry in the following decades, where foreign students pay on average twice or more the tuition fees paid by domestic students (Cai & Kivistö, 2013; Sanchez-Serra & Marconi, 2018).

Historically, the majority of European countries have approached international education from a noncommercial perspective. However, a shift is evident in some nations like France, Germany, and the Netherlands, which are beginning to view international higher education through the lens of an export strategy (The Academic Cooperation Association, 2008). In Nordic countries, known for their welfare state systems and commitment to equal educational opportunities, higher education has been provided free of charge to both domestic and international students for a relatively long period. However, following Denmark's initiation of a tuition fee policy reform in 2006, Sweden decided to make the move, becoming the second Nordic country to impose tuition fees on non-EU students. Likewise, Finland took similar strides to implement a trial reform during 2010-2014, charging tuition fees for non-EU students studying in specific programs, and finally validated this reform to implement the new tuition fee policy for all non-EU international students from 2017. Most recently, the Norwegian parliament proclaimed that starting from the fall

semester of 2023, all non-EU students will be required to pay tuition fees. Until the date by which our research is carried out, Iceland remains the only Nordic country that still sticks to providing free education indiscriminately for national and international students. Yet it is hard to predict whether it will also embrace the trend sometime soon. All in all, an obvious transition towards more market-oriented higher education especially for international students is taking place globally.

Plenty of previous research has investigated the effect of various changes in tuition fees on student enrolment behavior, nonetheless, empirical results on the sign of the effect of tuition fees on enrollment are ambiguous: In the case of the US, the tuition expense for a non-resident student attending a public four-year university in the US is more than two-and-a-half times the cost for a resident student. The finding by Noorbakhsh and Culp (2002) on the impact of tuition fees on student enrollment in the US might seem predictable: a rise in college expenses corresponds to a decline in enrollment rates. On the other hand, Dotterweich and Baryla (2005) discovered that non-resident students exhibited the least price sensitivity concerning the costliest (and potentially the most 'prestigious') institutions. Zhang (2007) observed that the demand from non-resident students was relatively inelastic, with a 1% hike in tuition fees resulting in a mere 0.2% decrease in non-resident enrollment, a figure even lower at selective institutions.

In terms of the UK, Dearden et al. (2011) estimated that a rise in tuition fees by £1000 triggers a 3.9% drop in higher education participation. While the research by Wakeling and Jefferies (2013) provides a straightforward examination of student mobility among the countries of the UK and the Republic of Ireland. They use the changes in student funding regimes between 2000 and 2010 as a natural experiment. However, their findings offer minimal backing to the notion that students migrate to benefit from more favorable tuition fee rates.

As for EU countries, the institutional background is very different, where tuition fees are considerably lower and private universities play only a very minor role. Germany incorporated tuition fees of approximately 1000 euros annually in higher education in select states between 2006 and 2007. Hübner (2012) utilized this occurrence as a natural experiment to assess the effect of tuition fees on enrollment rates. The study revealed that the initiation of 1000 Euro annual tuition fees had a modest yet statistically significant influence on enrollment rates. The average treatment

effect on those affected suggests that, in 2007, the enrollment rate among high-school graduates in states with fees was 2.76 percentage points less than what it might have been without tuition fees (Hübner, 2012). However, after introducing control variables and allowing state-specific effects of tuition fees on enrollment rates, Bruckmeier and Wigger (2014) do not find a significant effect on aggregate enrollment in those German states that introduced tuition fees. Yang and Wang (2016) examined the effect of tuition fees on non-EU students in Nordic countries and Germany. Their research indicates that there was a decrease in non-EU/EEA student enrollment in Denmark following the implementation of tuition fees, but this number rebounded after a few years. They attribute this recovery to the enlargement of the Danish scholarship system and the rapidly increasing demand in the global education market.

All in all, so far empirical data from various countries do not yield a definitive conclusion on the correlation between tuition fees and international student enrollment patterns. The introduction of tuition fees can impact students' inclination to pursue higher education and can influence their choices regarding educational mobility. In the U.S., students are more likely to remain in their resident state to take advantage of lower tuition costs. Similarly, in Germany, enrollment rates are lower in states with tuition fees compared to those with free tuition. Conversely, tuition fees can also signify an institution's academic legacy and prestige, suggesting potentially higher future earnings for graduates, which makes students' mobility decision less tuition fee elastic (Dwenger & Wrohlich, 2012). Furthermore, the adverse effect of tuition fees on student enrollment can be substantially offset by accompanying scholarship policies. In general, the relationship between tuition fees and factors such as student enrollment rate or tuition fee elasticity can differ across various student groups and university types. As of now, there is no unified agreement on these relationships (Havranek et al., 2018).

2.6 Sweden Tuition Fee Reform

With a long-standing bastion of a social democratic model of society, higher education in Sweden has been rather public and less influenced by neoliberal ideals like in other systems where the

market plays a dominating role (Benner & Holmqvist, 2023). The higher education sector in Sweden is mainly constituted of public institutions, with a handful of private entities that must adhere to specific rules and standards (Holmén & Ringarp, 2023). As a welfare state with a strong social democratic tradition, Sweden justifies its public expenditure, including on higher education, from a perspective of equity and income redistribution, aiming to alter inherent socioeconomic structures among its populace (Willemse & De Beer, 2012). This egalitarian viewpoint underlines higher education as a fundamental platform for equality, enabling every citizen to construct a life of quality, both intellectually and materially (Marcucci & Johnstone, 2007; de Gayardon, 2019).

The internationalization of higher education in Sweden was initially established as a policy area in the 1970s. This policy emphasized the concept, process, and desirability of internationalization for post-secondary education (SOU, 1973). According to Åkerlund (2020), the goal was to foster international solidarity and stimulate development in less developed regions of the world. Historically, the motivation for internationalization in Sweden was rooted in a foreign aid perspective, where fostering intercultural understanding would improve global collaboration and address worldwide issues (UKÄ, 1974). The long-standing ambition to open Sweden's educational system to international students aligns with a robust egalitarian and meritocratic tradition, viewing students as critical potential contributors to human capital, irrespective of their parents' financial circumstances, in the creation of a welfare system. Therefore, before the tuition reform in 2011, both domestic and international students were allowed to access higher education in Sweden free of charge.

However, in the last two decades, the free tuition fee policy for international students has been challenged with the economized discourse in Sweden. It is since this period that economic returns have taken a prominent place in the public debate, which also has led to the introduction of tuition fees (Bryntesson & Börjesson, 2019). The key aim of implementing the tuition fee reform was to share the financial burden of enhanced internationalization between taxpayers and international students. The reasoning was that ‘tuition fees offer a financially neutral method of increasing the number of foreign students at Swedish higher education institutions’ (Lundin & Geschwind, 2023). As such, the introduction of tuition fees was presented as 'the only financially viable solution to

persist with the strategy of boosting the number of international students' (Lundin & Geschwind, 2023).

Moreover, Sweden's more stagnating economy prompted a shift in the nation's development strategy towards a more 'knowledge-driven' approach. This strategy placed knowledge production and higher education at the heart of growth-promoting factors. As a result, it was deemed essential to engage in global competition to attract the most exceptional researchers and students, thereby fostering knowledge. Accordingly, the objective of internationalization of higher education shifts from a development aid perspective to improve the quality of education and research and thus overcome the global challenges that the world is facing and provide solutions for national and global sustainable development (SOU, 2018). The development guidance of this stage for the internationalization of higher education is Sweden becomes brand Sweden's attractiveness as a knowledge-oriented nation and increase Swedish higher education institutes' international visibility (SOU, 2018).

From this perspective, the rationale for implementing tuition fees for international students in Sweden is to stimulate 'quality-driven competition'. The idea is to attract academically superior students based on the quality of education, rather than solely through the provision of free tuition (Lundin & Geschwind, 2023). According to a national survey conducted before the reform, it indicates that free education was on top of the main reasons for international students choosing Sweden as their study destination (Prop, 2009). The government posited that by charging tuition fees in higher education to international students, Swedish universities would be compelled to compete on an even footing with institutions in Europe and beyond. Hence, with the introduction of substantial tuition fees, Swedish Higher Education Institutions could no longer passively attract international students based on free education alone. Instead, they would need to pivot their focus toward enhancing the quality of their offerings (Prop, 2009).

As a result, the Swedish government formally presented a bill in parliament that proposes the introduction of application and tuition fees for students outside the EU/EEA for the autumn 2011 term. From 2011 fall semester, students from countries outside the EU/EEA and Switzerland have to pay tuition fees for education at the undergraduate and advanced levels. Doctoral-level studies

remain free of charge for all foreign students. The costs range between 80,000 and 140,000 SEK per year depending on the study program and university.

To mitigate the influence of the introduction of tuition fees on students who are financially disadvantaged, two scholarship systems were introduced at the same time. The first program, initially funded with 30 million SEK per year, is aimed at students from the 12 countries with which Sweden maintains long-term development cooperation. Managed by the Swedish Institute, these scholarships will cover both living expenses and tuition fees. The second scholarship system, funded with 30 million SEK in 2011 and 60 million SEK from 2012 onwards, is intended for highly qualified students. These funds will be distributed to universities and higher education institutions, which will in turn allocate the scholarships to deserving students.

The introduction of the new policy had an immediate and significant impact, leading to an 80% drop in the number of international students from countries that were now obligated to pay tuition fees in Sweden in 2011. Since then, the number of students has increased again, however, the scale of international students is yet to reach the level before the reform. Meanwhile, the composition of students' structure has been significantly influenced by the tuition fee policy.

3 Data

The data source and brief descriptive features of all the data used in this paper are displayed in Table 1.

Table1. Data Source

Variable	Definition	Unit	Source	Mean	SD	Min	Max
Student	Free-mover students from abroad in Swedish higher education for the first time		SCB (Statistics Sweden)	111.9701	194.6639	0	1319
Scholarship	The number of students who don't pay tuition fees of the origin country. It is calculated by the number of total free-mover students minus the part who are paying tuition fees		SCB (Statistics Sweden)	7.845912	14.84518	0	93
GDPSweden	GDP per capita of Sweden (constant 2015 US $)	US $	The World Bank: World Development Indicators	50236.56	2163.364	46043.48	53490.35
GDPOrigin	GDP per capita of students' country of origin (constant 2015 US $)	US $	The World Bank: World Development Indicators	20761.17	21364.76	384.5727	87123.66
Unirep	Number of TOP200 universities in Sweden based on ShanghaiRanking Consultancy		Shanghai Academic Ranking of World Universities	4.5	0.5003935	4	5
Population	Population of students' country of origin.		The World Bank: World Development Indicators	1.01e+08	2.52e+08	317414	1.41e+09

Distance	Air distance between the countries' largest traffic airport city to Stockholm	km	DistanceFromTo https://www.distancefromto.net/	4150.703	3677.32	378.77	15596.44

3.1 Description of the Dependent Variable

In order to investigate the impact of charging tuition fees to non-EU students on their mobility patterns, the statistics of international students' enrollment numbers by their country of origin before and after the policy change are necessary. This paper access the number of enrolled international students in Swedish higher education by their country of origin from International Mobility in higher education from a Swedish Perspective 2012-2019, which is an annual report disclosing international mobility in Swedish higher education published by SCB (Statistics Sweden) every year.

To be noticed, international students in the report include both exchange students and free-mover students. Being an exchange student means that students study in Swedish higher education institutes as part of their home country's university education program, which is most of the time through the partnerships between students' home universities and Swedish universities. For exchange students, they are not required to pay tuition fees to Swedish universities they are exchanging to. While free-mover students refer to the students who apply for studying in Swedish higher education institutes individually instead of through partnerships between other abroad institutes and Swedish universities. They are responsible for the application process and paying the tuition fee.

For our research purpose, we have opted to focus on data pertaining to free-mover students as representative of the international student population. Exchange students, being exempt from tuition fees at Swedish universities both pre and post the 2011 tuition fee reform, aren't significantly affected by this policy in terms of their mobility choices. In contrast, free-mover students, who prior to the autumn semester of 2011 enjoyed the same tuition-free benefits as

domestic Swedish students, have been obligated to pay tuition fees since then. It's reasonable to assume that the imposition of these additional costs might influence their decision to pursue higher education in Sweden. For the sake of clarity and conciseness in this paper, the term international students will be used to refer to free-mover students.

Furthermore, in our research, we have centered our attention on data pertaining to international students who are enrolling in Swedish higher education institutions for the first time. This is because a student's choice of whether to continue their studies in Swedish higher education institutes can be influenced by numerous factors other than tuition fees, aspects that lie beyond the scope of this study.

We have selected the main international students' origin countries in each continent considering the students' scale and the data availability over time. To be noticed, for comparison purposes, we have distinguished countries that are required to pay and countries that are exempted from tuition fees in Europe with the term Europe and EU respectively. Europe here refers to European countries outside of the EU/EEA and Switzerland. EU refers to EU/EEA countries plus Switzerland.

In 2008, students from the selected African countries constituted 83.3% of the total number of African international students. Similarly, international students from the chosen Asian countries represented 87.7% of all Asian international students during the same year. Regarding North and South America, international students from the specified countries comprised 90.7% and 67.7% of their respective total international student populations. For Europe and Oceania, the proportion of international students from the specified countries in 2008 was 79.3% and 82.1% respectively. International students from the selected EU countries represent 99.3% of the whole EU international students in 2008. The countries selected and the regions they belong to can be seen in Table 2.

Table 2. List of Countries

Asia	Africa	North America	South America	Europe (EU)		Europe (Non-EU)	Oceania
Bangladesh	Cameroon	USA	Brazil	Austria	Ireland	Albania	Australia
India	Egypt	Canada	Chile	Belgium	Italy	Russia	
Iran	Ethiopia	Mexico	Columbia	Britain	Latvia	Serbia	
China	Ghana		Ecuador	Bulgaria	Lithuania	Turkey	
Pakistan	Kenya			Czech	Netherlands	Ukraine	
Thailand	Nigeria			Denmark	Norway		
	South Africa			Estonia	Poland		
	Tanzania			Finland	Portugal		
	Uganda			France	Romania		
				Germany	Slovakia		
				Greece	Spain		
				Hungary	Switzerland		
				Iceland			

3.2 Description of the Independent Variables

First, we have constructed a dummy variable capturing the implementation of the tuition fee policy. If an international student's country of origin falls into the countries that are exempted from tuition fees in Swedish higher education institutes (EU/EEA countries and Switzerland), then the tuition fee dummy equals 0, otherwise, the variable value equals 1. Since the tuition fee dummy varies among countries, we can access the different impacts of tuition fees on international student inflows from different countries and regions.

Second, we have constructed a time dummy variable indicating the years before and after the policy change. For years that are pre-2011, the variable value is 0, while from 2011 and years after, the variable value takes 1. The COVID-19 pandemic has had severe impacts on health, economy, and various sectors globally. Notably, it has substantially curtailed international migration, including the mobility of international students (OECD, 2022). To exclude the aberrations in international student inflow patterns caused by this unique event, we decided to limit our data to the pre-pandemic period. As such, our study uses enrollment data for international students in Swedish higher education institutions up to the year 2019. This decision ensures our analysis is grounded in regular patterns rather than the irregularities induced by the pandemic. Consequently,

the temporal scope of our research spans from 2008, when we were first able to obtain data relevant to our study, through to 2019, marking the final pre-pandemic year.
On top of it, we have generated an interaction variable named Tuition Fee* Post, which takes the value of the tuition dummy multiply the time dummy. This interaction term, Post*Treated, is central to our analysis as it represents the average effect of the tuition fee introduction on non-EU international students' enrollment after the policy implementation compared to the period before.

In our analysis, we account for a range of other factors that can influence students' decisions to study abroad, beyond just the tuition fee policy. These control variables are selected based on widely recognized determinants of international student mobility, indicating the major aspects that concern international students' mobility decisions.

Firstly, we consider the GDP per capita of Sweden. This serves as a measure of the country's overall economic prosperity and standard of living. The implications of Sweden's GDP for international student mobility can be multifaceted. On one side, a high GDP per capita can signify a flourishing economy and superior living conditions, making Sweden an appealing destination for international students, particularly those who aim to find employment and reside in Sweden post-graduation. Conversely, a high GDP per capita can also indicate elevated living expenses, which might serve as a deterrent for prospective international students.

Secondly, we take into account the GDP per capita of the students' countries of origin. This serves as a potential indicator of the financial capacity of students or their families to finance an education abroad, which in turn could influence their decision to study overseas. Consequently, it's reasonable to posit that the GDP per capita of students' home countries would have a positive correlation with student migration, as higher GDP per capita typically translates into greater ability to afford international education.

Thirdly, we look at the number of students awarded scholarships. Due to the limitation of data availability, we could not directly get the data on the students who are granted scholarships. Instead, we subtract the number of fee-paying students in each country from the total number of international students in each country as a proxy to measure scholarship student numbers.

Scholarships can profoundly impact a student's decision for studying abroad, especially for students from developing countries who cannot afford tuition fees in Sweden. Hypothetically, scholarships are anticipated to boost the inflow of international students, hence we assume a positive correlation between scholarships and student migration.

The fourth control variable is the reputation of Swedish universities, represented by the number of Swedish universities ranked in the top 200 according to ShanghaiRanking Consultancy. The reputation of educational institutions often plays a crucial role in attracting international students.

Another control variable is the population of students' origin countries. It captures the size of a country's human component and is supposed to have a positive correlation with the students studying abroad. Countries with larger populations might send more students abroad simply because they have more potential students. Also Bigger populations often imply greater diversity in terms of socio-economic backgrounds, aspirations, and access to resources, which can impact decisions to study abroad.

Lastly, we account for the geographical distance between the student's country of origin and Sweden in our control variables. To measure this, we utilize the aerial distance from each student's home country's busiest airport to Stockholm, Sweden's busiest airport. This particular method of measurement was chosen as air travel is the most common mode of transportation for international students. The distance can be a significant factor affecting international students' choices, impacting both travel costs and the psychological aspect of being far from home. Ordinarily, the greater the distance between the home country and the destination, the more barriers there are likely to be, which could impact the students' decision to study abroad.

4 Method

In this research, we will utilize the difference-in-difference (DiD) analytical method. This approach is a commonly employed research technique used to measure the effect of policy interventions. Its application is prominent in past studies examining the impact of introducing or increasing tuition fees in educational institutes of various countries on student enrollment (Bruckmeier & Wigger, 2014; Hübner, 2012; King & Sondhi, 2018; Paneru, 2019; Vortisch, 2023). A conventional DiD model typically comprises four crucial components: the event, the treatment group, the control group, and the time period. The method derives its intuitive appeal from its ability to make comparisons across different groups (treatment-control) and over time (before-after) (Fredriksson & Oliveira, 2019).

Since the tuition fee policy change only applies to non-EU international students, EU students' mobility decisions are not affected by this reform, which constitutes an ideal setting for a natural experiment to examine the effect of the tuition fee policy. Our research design idea is to use EU students as the control group, while non-EU students as the treatment group, the year 2011 marks the distinction of tuition fee policy in Sweden before and after. Therefore, we have constructed a group dummy, which takes the value 0 when the observations belong to our control group and 1 when it is in the treatment group. Similarly, a time dummy variable is created, with the year before 2011 taking a value of 0, and the year 2011 and beyond are designated with a value of 1. The time dummy variable could indicate whether a year is pre or post the tuition fee reform.

We will use the comparison of the difference between EU and non-EU first-time international students enrolled in Swedish higher education institutes before and after the tuition fee reform to study the impact of the policy change. In further analyses, I group the non-EU students according to continent level to evaluate geographical variation for international students' regions of origin. The varying differences change in each continent will allow us to analyze how the tuition fee policy affects various student groups differently. Furthermore, we aim to observe the variations in

the short term and medium term to gain a comprehensive understanding of the impact of the tuition fee policy reform on international student mobility, from the perspective of Sweden.

Based on the framework of Beine et al. (2014) about the determinants of the international mobility of students, various factors associated with students' decision to study abroad can be generally categorized into two groups: those affecting the migration costs such as distance and migrants' network at destination and those affecting the attractiveness of the destination such as education costs and the quality of universities. Their research result indicates that the wage and the higher education quality of the destination country are prominent factors in international students' consideration (Beine et al., 2014). Above all, we have chosen the GDP per capital of Sweden and students' origin country, scholarship student number, distance from students' home country to Sweden as our control variables regarding migration cost, and the number of world 200 universities in Sweden as a proxy for factors accounting for the education quality.

To be mentioned, in order to rescale the data, reduce the variance of large values and make the parameter interpretation more intuitively translated to the percentage change, we have adopted the logarithm of our outcome variable: international student number; GDP, population and distance data in the control variables are also transformed to the logarithm format.

Hence, our model for the analysis of the research question is constructed as follow:

$$International_{i,t} = \alpha + \beta_1 Post \times Fee_{i,t} + \beta_2 Fee_i + \beta_3 Post_t + \beta_4 Control_{i,t} + \varepsilon_{i,t} \quad (1)$$

Where i denotes country, t denotes time. $International_{i,t}$ refers to the variable of interest: the number of enrolled first-time international students in Swedish higher education institutes in log. Variable Fee_i is a binary variable indicating the control group and treatment group, the variable value takes 0 when the observation belongs to the control group and 1 for the treatment group. While Post is a dummy variable indicating pre or post reform, it takes the value of 0 before 2011, the value of 1 from 2011. $Control_{i,t}$ is a vector of all the control variables as outlined above. α is a constant and $\varepsilon_{i,t}$ is the residual error term following normal distribution.

Table 1 displays the parameters used in calculating the value of the dependent variable for all possible combinations of the Difference-in-difference regression. For example, if an observation belongs to the group facing restrictions during the time period when the restrictions are in place its value is determined by the sum of every parameter i.e. $\alpha + \beta + \gamma + \delta$. The table also visualizes the difference between how the dependent variable is calculated between time periods and which group it belongs to.

In the table below we visually display the interpretation of the parameters. Our main coefficient of interest is β_1, as it describes the impact of the tuition fee policy on international student enrollment in higher education in Sweden.

Table 3 Interpretation of the Difference-in-difference parameters

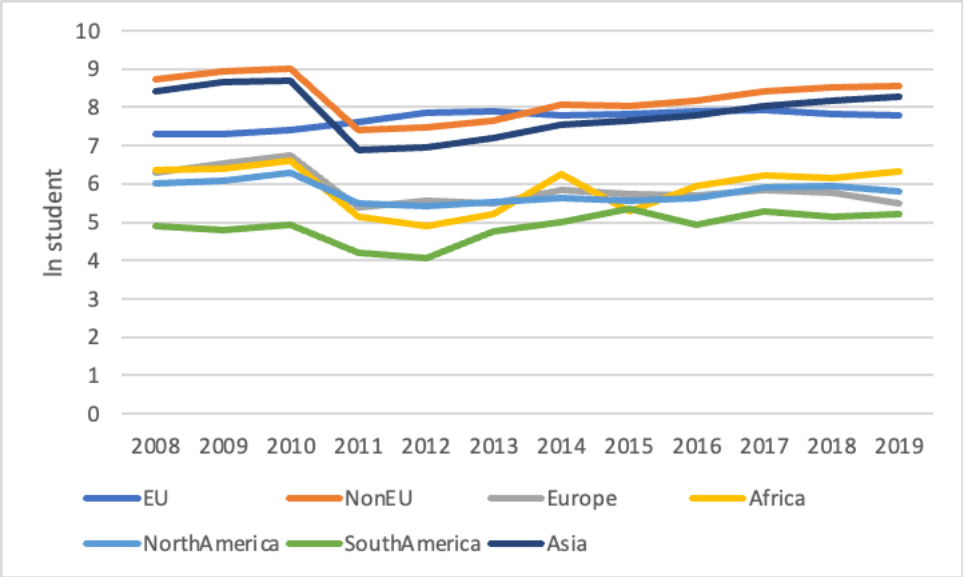
	Before Reform	Post Reform	Difference
Control Group	$\alpha + \beta_4$	$\alpha + \beta_3 + \beta_4$	β_3
Treatment Group	$\alpha + \beta_2 + \beta_4$	$\alpha + \beta_1 + \beta_2 + \beta_3 + \beta_4$	$\beta_1 + \beta_3$
Difference	β_2	$\beta_1 + \beta_2$	β_1

The core presumption that gives credibility to the difference-in-difference estimation is the parallel trend assumption. This assumption dictates that, in the absence of intervention, the differential between the control and treatment groups would have remained consistent over time (Angrist & Pischke, 2009). In the context of our study, this assumption suggests that the growth trends in EU and non-EU student numbers would have stayed the same if the Swedish government had not implemented the tuition fee policy in 2011. The parallel trend principle underscores the necessity of picking an appropriate control group to make meaningful inferences from the difference-in-difference regression. Finally, it's worth noting that there is no formal statistical test available to validate whether the parallel trend assumption holds true; rather, its verification depends on a visual inspection of the data (Angrist & Pischke, 2009).

As can be observed in figure 1, before the introduction of tuition fees for non-EU students in 2011, there is a general parallel trend in the growth of students from the control group EU and its

counterparts. The reform starting year, 2011 marks a tremendous shifting point of the growth patterns of students in control and treatment group.

Figure 1 International Student Mobility Trend (in log)



5 Results and Discussion

5.1 Results

Table 4 presents the main regression results of equation (1) using our analysis comparing our control group (EU international students) and our treatment group (non-EU international students). Column (1) provides the regression outcome without any control variables factored into the model. Column (2) demonstrates the estimation outcome when we integrate the control variables discussed in the preceding section, chosen for their significant influence on international student mobility. In this column, we constrain our timeframe to the year 2014 to assess the short-term effects of the tuition fee policy on international student inflows. Column (3) incorporates the same variables as column 2 but expands the timeframe to the most recent available year, 2019, for a broader examination of the tuition fee reform's long-term impact.

First of all, as revealed by the parameter of the interaction variable, the introduction of tuition fee in Sweden for non-EU students has a significant negative impact on the enrollment of international students from these regions. For all specifications, estimates are similar and highly statistically significant. After controlling other relevant factors that also fluctuate international student mobility, the effect of tuition fee reform is even more obvious, shown by the larger numeric value of the parameter after adding control variables in column (2) and (3).

Table 4. Regression Result of EU and Non-EU International Student Comparison

Variables	(1)	(2)	(3)
Tuition Fee * Post	-1.365***	-1.864***	-1.587***
	-0.246	-0.205	-0.17
Post	0.449**	0.410**	0.218
	-0.178	-0.165	-0.137
Tuition Fee	0.785***	0.805***	0.673***
	-0.186	-0.206	-0.176
Scholarship		0.023***	0.022***
		-0.005	-0.003
GDP per capita of Origin Country (in log)		0.080*	0.088**
		-0.046	-0.035
GDP per capita of Sweden (in log)		-0.001	1.814
		-2.827	-1.659
Distance (in log)		-0.495***	-0.418***
		-0.075	-0.056
Population of Origin Country (in log)		0.487***	0.501***
		-0.039	-0.029
World Top200 Univesities Number in Sweden		0.164	0.127
		-0.146	-0.127
_cons	3.623***	-2.201	-22.449
	-0.135	-30.305	-17.495
N	365	365	630

Standard errors in parentheses
*** p<0.1 ** p<0.05 *** p<0.01**

Secondly, by comparing the coefficients of the interaction term in column (2) and (3), our estimation results indicate that the tuition fee reform has a deeper impact on non-EU students'

inflow to Sweden in the short term than a longer period. The coefficient estimates indicate that when holding all other variables constant, being from non-EU countries (treated group) is associated with a 84.5% decrease in the short run in the logged number of international students enrolled in Swedish higher education institutes in the short run and 79.6% decrease in the longer time span. This result is statistically significant at the 5% level.

What is more, our regression results show that the GDP per capita of the students' origin country has a significant positive influence on international students' migration to Sweden, especially in the long run, the effect of the GDP per capita, which signals students' home countries' economic state, has bigger impact on students' migration decision to coming to Sweden for higher education. In the long term, one percent of rise in GDP per capita is connected with 8.8% increase in the number of non-EU students enrolled in Swedish higher education institutes.

Moreover, we also find that the population of the origin country and the scholarship provision has significant positive impact on international student mobility in Sweden. While the distance between students' origin country has a significant negative impact on international students' migration to Sweden. In other words, the more prosperous economy of the students' origin country, the more students from the county will be likely to move to Sweden for higher education. The further the students' origin countries are located from Sweden, the less of the students from the countries will come to Sweden to pursue their studies.

On the other hand, our estimations also suggest that international students' mobility to Sweden is not significantly connected with the GDP per capita of Sweden or the education reputation of Swedish universities in our research time span. The insignificant and sometimes negative estimates for GDP per capita of Sweden are contrary to previous findings in the literature.

Table 5 presents the regression results on the effect of the tuition fee reform on the changes in the international students from different continents in the short term. Similar settings of control variables and expansion of time period estimation have also been placed but not reported here (see Appendix 1).

Following the underlying presumption of the Difference-in-Differences method, the student population from various continents in Sweden is anticipated to remain similar trends to the EU international student population over time. Regardless of their origin, the shift in the size of international students from each continent remains consistent post the tuition fee reform. Regardless of their inclusion in the treated group affected by the policy, no significant divergence was observed in the post-reform period across any continent. However, the regression results in table 5 shows that the claim for lower enrollment numbers due to the policy cannot be rejected for Africa, the Asia, and Europe.

Coefficient estimates indicate that being from Africa (a treatment group) is associated with a 52.6% decrease in the logged number of students after the policy change, holding all other variables constant. This result is statistically significant at the 5% level. The tuition fee reform has the strongest impact on Asian student group, where being from Asian countries is associated with a 83.2% drop in the logged number of students after the policy change. International students from Europe outside of EU are also significantly influenced by the tuition fee reform, there is 46.2% decrease in the logged number of international students in Swedish higher education institutes associated with the students from Europe outside of EU. While there is no evidence support a significant association between the policy change and the change of international students from North America, South America and Ocean in post reform era, with the coefficients of the interaction terms in these continents not statistically significant.

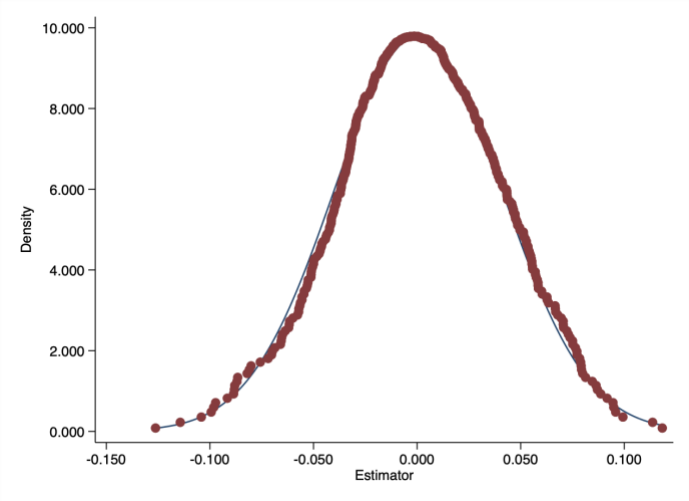
Table 5 Regression Results on Continent Differences

	Asia	Africa	Europe	North America	South America	Oceania
Post * Tuition Fee	-1.786***	-0.746***	-0.619*	-0.634	-0.12	-0.451
	-0.295	-0.263	-0.347	-0.461	-0.402	-0.75
Post	-0.236*	-0.259*	-0.369**	-0.379**	-0.393**	-0.402***
	(0.133)	(0.153)	(0.154)	(0.153)	(0.154)	(0.153)
Tuition Fee	2.527***	-0.410*	-0.037	0.642*	-0.573*	0.39
	-0.228	-0.228	-0.267	-0.352	-0.317	-0.595
_cons	-5.728	-6.142	-6.544	-6.638	-8.31	-6.944
	-28.835	-32.236	-33.282	-33.485	-33.277	-33.62
N	216	235	209	195	199	181

Standard errors in parentheses
*** p<0.1 ** p<0.05 *** p<0.01**

To scrutinize the reliability of our estimated results, we carried out a robustness check. In this check, 132 out of the 365 samples were arbitrarily chosen as a "pseudo-treatment group" for a placebo test. This random selection process was replicated 500 times. We then conducted regression analysis using the product of the time dummy variable as the core explanatory variable. The idea is to apply the same analysis used to estimate the causal effect to data where no effect is expected. If the regression results of this simulated test group prove to be insignificant, it would indicate that our prior model results, based on the actual treatment group, are valid. The outcome of our placebo test is demonstrated in Figure 2. It is clear from the figure that the distribution of the model's regression coefficients cluster around zero, which adds further credence to our findings on the impact of the tuition reform in Sweden on international students' mobility.

Figure 2 Placebo Test Result



5.2 Discussion

Tuition fees for international students in higher education have been an intensely debated topic in the countries that used to provide free education opportunities for both domestic and international students regardless of their socio-economic backgrounds. One of the major concerns for imposing tuition fees on non-EU international students is that it will substantially increase the costs of international students coming to Sweden, thus creating barriers for students especially those from disadvantageous financial backgrounds accessing equal education opportunities. In addition, the introduction of tuition fees implied that most students from low-income countries became dependent on scholarship programs to pursue their studies in Sweden, the decreasing number of students from less developed countries can adversely impact the objective of development aid, which is aimed at combating poverty and promoting democratic progress in these students' countries of origin (Nilsson &Westin, 2022).

As a result of the introduction of tuition fees in Sweden for non-EU students, the incoming international students from non-EU countries decreased by 80% in 2011. Our research confirms that the imposition of tuition fees for non-EU students has caused a sizeable decrease in the international student numbers in Sweden from the countries that are required to pay tuition fees

both in the short term and longer time period. What is more, our estimation results further prove that the tuition fee policy strikes different regions differently. While there were no significant changes in the incoming students to Sweden from more developed countries associated with the tuition fee reform, contrarily, the tuition fee reform has caused a considerable drop in the number of students from the developing worlds in Asia, Africa, and non-EU European countries.

Accompanying the tuition fee reform, two scholarship schemes were unveiled: a 'scholarship program for students in partner countries' and a 'scholarship program as a recruitment instrument for higher education institutions for exceptionally qualified students.' The rationale behind these scholarships, while levying tuition fees universally on all non-EU students, is that wealthier international students would self-fund, while Swedish taxpayer money could be redirected to aid less financially stable international students through these new scholarship programs, and as a result, it could relieve the financial burden of the Swedish public fundings and at the same time ensure the equity for international students from developing countries (Lundin& Geschwind, 2023).

Nonetheless, our research findings indicate that despite the introduction of additional scholarship programs, the imposition of tuition fees for non-EU students still significantly influences the composition of the international student population. For instance, the student population from Pakistan, which was the second largest source of Asian students in Sweden in 2008 with 1083 students, had reduced to just 602 by 2019. This is slightly more than half the number compared to the period before the introduction of tuition fees. Similarly, there has been a substantial decrease in the number of international students from Iran. From a peak of 768 students in 2008, the count fell to just 290 in 2019, a drop of 62.2%.

Advocates for implementing tuition fees for non-EU international students argue that a total absence of tuition fees for these students creates a problematic situation. The sustainability and legitimacy of the welfare state are often viewed in the context of the 'collective action problem'. This suggests that maintaining taxpayers' support for the system necessitates that all citizens make appropriate contributions (Rothstein 2001). The provision of overall free higher education has extreme reliance on a high share of public funding. Unlike the situation with tax-paying domestic

students, the public rate of return is negative when international students move abroad soon after they graduate (Lundin& Geschwind, 2023).

In addition, supporters of tuition fee reform argue that keeping higher education free for international students leads to regressive income distribution within the country. This suggests that funds are shifted from lower-income Swedish taxpayers, who are underrepresented in higher education, to international students, who typically come from middle and upper socio-economic backgrounds. Therefore, the introduction of tuition fees for international students can be seen as a method to advance the political goal of promoting fairness and achieving greater distributional justice.

Furthermore, another driving force behind the implementation of the tuition fee reform is the Swedish government's aspiration to instigate a 'quality-driven' transformation in higher education. The aim is to compete for talented students globally on the same ground as other countries, rather than merely relying on attracting international students with free tuition fees (SOU, 2018). The Swedish government's strategic plan for the internationalization of its higher education highlights the country's lag in the intense global race toward the internationalization of higher education. Therefore, it is imperative to draw proficient international students and staff to sustain high-level education and research, and to furnish Sweden's knowledge-based society with highly skilled personnel and knowledge (SOU, 2018). Without the advantage of free tuition fees, Swedish higher education institutes would be pressured to enhance their quality and increase their international visibility to attract international students.

One of the surging problems in the free tuition fee period was that there was a low achievement rate among international students, as there was a low cost of applying for studying in Sweden, some international students took advantage of the free education policy, mainly using the student identity as an approach to acquire the visa to enter the Schengen Area. With the implementation of the new tuition fee policy, it would the cost of studying in Sweden, as a result, it could effectively reduce the possibility of less qualified and less motivated international students choosing Sweden as their study destination (Nilsson &Westin, 2022). Thus, the implementation

of tuition fees could serve as a tool to select candidates with stronger study motivation and more qualified profiles.

Indeed, based on our study, we could notice that in a longer inspection period, the negative impact of the tuition fee policy on international student mobility is mitigated. As shown in our estimation result, the coefficient of the interaction term becomes smaller for the whole non-EU student population and also for continents that were strongly affected by the policy change. It correlates with the steady recovery from the price effect after the initial years of the tuition fee reform. The possible explanations for the long-term bounce up in the number of international students from non-EU countries could derive from both the demand and supply sides.

Over the last decade, there has been a remarkable increase in the global demand for higher education, and consequently, international student mobility has seen a significant rise. The reasons behind this surge are multifaceted. Economies worldwide are transitioning towards knowledge-based structures, increasing the demand for highly skilled workers. Higher education is seen as a pathway to gain these necessary skills, which is driving the demand.

International student mobility, a significant component of this global higher education trend, has also seen exponential growth. The OECD's Education at a Glance (2020) report states that the number of international students worldwide increased from 2 million in 2000 to approximately 5.3 million in 2017. This growth is driven by various factors including but not limited to aspirations for improved career prospects, the desire for cultural experiences, and access to specialized academic programs. In addition, globalizing forces and advancements in technology have made international travel and communication easier, thereby making studying abroad a more feasible and appealing option. All in all, the combined factors have driven a substantial increase in the demand for across-border higher education, which could be partially associated with the steady increase in international students from non-EU countries in Sweden.

From the supply side, as we have discussed above, one of the intentions of the introduction of tuition fees was to trigger ‘quality-driven’ competition and increase the attractiveness of Sweden as a study destination beyond the tuition fee advantages. After the tuition fee reform, there has

been a notable surge in the number of courses offered in English in Swedish higher education institutions. In 2020, an average of 66% of instruction at an advanced level was in English, marking an average increase of 15.7 percentage compared to 10 years ago. Simultaneously, it's noteworthy that 24% of courses taught in Swedish do not require compulsory course literature in the Swedish language; instead, all literature is in English. The growing availability of programs in English has mitigated language obstacles for international students, which can be perceived as an active attempt by Swedish higher education institutes to increase their competitiveness and a higher level of globalization in Swedish higher education institutes responding to the tuition fee reform (Malmström & Pecorari, 2022).

Nilsson and Westin (2022) also argue that students paying tuition fees would become more scrutinizing of any perceived deficiencies and quality gaps in their education. According to the Swedish Supreme Court, universities are obligated to refund a portion of the tuition fee to a student if there is a quality deficit in the provided education. Clearly, the imposition of fees increases students' interest in the quality of their education and their scrutiny of the university's actual delivery against its promised offerings (Nilsson & Westin, 2022). With students' amplified attention to educational quality, Swedish higher education institutions are compelled to enhance the supply of their educational content. This improvement will ultimately benefit themselves in boosting their appeal to international students, which could partially explain the recovering international student mobility in Swedish higher education.

6 Conclusion

The internationalization of higher education is an intentional process of integrating an international, intercultural or global dimension into the purpose, functions and delivery of post-secondary education, in order to enhance the quality of education and research for all students and staff, and to make a meaningful contribution to society (de Wit et al., 2015). International student mobility, a critical facet of this internationalization, facilitates the cross-border exchange of knowledge and promotes the dissemination of ideas and values between nations. Student mobility aids in bridging the gap in education capacity in the students' home countries, drives innovation crucial for economic growth and integrates global perspectives into research intended to address shared global challenges. Furthermore, the migration of students from less developed to developed nations is a crucial conduit for global development, which can alleviate poverty, fulfill development objectives, and ultimately promote global convergence. Given these reasons, it's crucial to engage in discussions around this topic.

In recent decades, there is a global trend of commercialization of higher education, signaled by more and more developed countries start to treat higher education as an export service, using the tuition fee from international students as a big revenue for the institutes' income. Sweden, due to the welfare country system deeply rooted in social democratic model, used to provide free higher education as other Nordic peers for national and international students indiscriminately. However, since 2011, driven by economic disclosure and the motivation to transit to a 'quality driven' competition in the internationalization of higher education, started to impose tuition fee for non-EU students, which has directly resulted in a huge drop in international students from the affected countries in the first few years of the reform.

In this study, our research interest is to examine the impact of this policy change on international student mobility. We want to know whether this reform has brought substantial shift in international student mobility in Sweden, if so, whether its impact varied in the short and long

term, and how the response to the tuition fee reform varied among international students from different continents. To answer these research queries, we utilized the difference-in-differences method, which is a commonly used method to examine the change in trends after an intervened event. We designated EU students as our control group, while non-EU international students in Sweden made up our treatment group. By analyzing the difference in trend changes of EU and non-EU international students before and after the reform, we can determine the impact of the tuition fee reform on international student mobility.

Our findings show that the introduction of tuition fees for non-EU students led to a significant drop in international student mobility in Sweden. Even though the negative effect lessened when we extended the study period, the impact remained considerable. Furthermore, we noticed substantial variations in the effect of tuition fees on international students based on their continent of origin. Enrollment of students from Asia, Africa, and non-EU Europe was most responsive to the introduction of fees, whereas the correlation between tuition fees and international student mobility from North and South America, and Oceania, was insignificant in our findings.

Predicting future trends in international student mobility in Sweden is a challenging task due to the multifaceted nature of the issue, with factors extending beyond tuition fees. For instance, the socio-economic standing of students' home countries, the size of scholarships, and demographic shifts in the countries of origin, all contribute to shaping this scenario.

However, this study offers valuable insights by quantitatively assessing the impact of the 2011 tuition fee reform in Sweden on international student mobility. These findings have substantial implications for educational policies. The data suggests that imposing fees solely on international students significantly alters the composition of the student body, with more pronounced responses in less developed countries. In view of the global development goals, it is vital to address the marked decrease in international students from low-income countries using various strategies such as scholarships.

On the flip side, the tuition fee reform may have accomplished its aim of attracting students with higher qualifications and stronger study motivation. This could have a positive effect on elevating

the quality of Sweden's higher education system, fostering innovation, and enticing potential skilled workers. Future research is necessary to evaluate the long-term outcomes of the policy and explore its impact beyond the number of international students.

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Appendix A

Variables	Africa		Asia		Europe		North America		South America		Oceania	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Tuition Fee * Post	-0.746***	-0.607***	-1.786***	-1.402***	-0.619*	-0.649**	-0.634	-0.694*	-0.120	0.083	-0.451	-0.471
	(0.263)	(0.215)	(0.295)	(0.237)	(0.347)	(0.282)	(0.461)	(0.369)	(0.402)	(0.324)	(0.750)	(0.612)
Tuition Fee	-0.410*	-0.304	2.527***	2.526***	-0.037	-0.009	0.642*	0.513	-0.573*	-0.567*	0.390	0.239
	(0.228)	(0.203)	(0.228)	(0.210)	(0.267)	(0.246)	(0.352)	(0.322)	(0.317)	(0.291)	(0.595)	(0.545)
Post	-0.259*	-0.367***	-0.236*	-0.321***	-0.369**	-0.444***	-0.379**	-0.454***	-0.393**	-0.482***	-0.402***	-0.473***
	(0.153)	(0.121)	(0.133)	(0.107)	(0.154)	(0.121)	(0.153)	(0.121)	(0.154)	(0.122)	(0.153)	(0.121)
Scholarship	0.002	0.006**	0.007*	0.007**	0.007	0.010***	0.005	0.009***	0.003	0.007**	0.005	0.007**
	(0.004)	(0.003)	(0.004)	(0.003)	(0.005)	(0.003)	(0.005)	(0.003)	(0.004)	(0.003)	(0.005)	(0.003)
GDP per capita of Origin Country (in log)	-0.026	0.025	0.181***	0.220***	0.081*	0.118***	0.084*	0.149***	0.122***	0.162***	0.100**	0.153***
	(0.050)	(0.036)	(0.038)	(0.028)	(0.044)	(0.032)	(0.047)	(0.034)	(0.043)	(0.031)	(0.046)	(0.033)
GDP per capita of Sweden (in log)	0.428	1.902	0.410	1.743	0.426	1.828	0.425	1.777	0.472	1.787	0.413	1.762
	(3.007)	(1.716)	(2.690)	(1.550)	(3.105)	(1.752)	(3.124)	(1.774)	(3.104)	(1.765)	(3.136)	(1.778)
Distance	-0.481***	-0.476***	-0.510***	-0.494***	-0.585***	-0.583***	-0.571***	-0.533***	-0.455***	-0.456***	-0.556***	-0.524***
	(0.064)	(0.046)	(0.057)	(0.041)	(0.067)	(0.048)	(0.069)	(0.049)	(0.072)	(0.052)	(0.072)	(0.051)
Population of Origin Country	0.511***	0.517***	0.387***	0.406***	0.529***	0.531***	0.523***	0.532***	0.520***	0.525***	0.535***	0.536***
	(0.041)	(0.030)	(0.039)	(0.029)	(0.042)	(0.030)	(0.042)	(0.031)	(0.042)	(0.031)	(0.043)	(0.031)
World Top200 Univesities Number in Sweden	0.230	0.159	0.203	0.153	0.204	0.142	0.211	0.146	0.221	0.153	0.212	0.149
	(0.155)	(0.131)	(0.139)	(0.118)	(0.160)	(0.134)	(0.161)	(0.135)	(0.160)	(0.135)	(0.162)	(0.136)
_cons	-6.142	-22.353	-5.728	-20.698	-6.544	-21.777	-6.638	-21.978	-8.310	-22.648	-6.944	-21.974
	(32.236)	(18.088)	(28.835)	(16.345)	(33.282)	(18.468)	(33.485)	(18.705)	(33.277)	(18.607)	(33.620)	(18.747)
N	365	630	365	630	365	630	365	630	365	630	365	630

Standard errors in parentheses
*** p<0.1 ** p<0.05 *** p<0.01**